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LOW BAROMETER ON OCTOBER 13TH—14TH, 1891.

THE pressure at sea level having at 1.15 a.m. on October 14th fallen, at Cawdor Castle, Nairn, N.B., below 28 inches, the Earl of Cawdor was good enough to send us the tracing of his Richard barograph. We compared it with the sea level pressure at Nairn, as recorded at 8 a.m. and 6 p.m. in the Daily Weather Report, and found that the instrument was working perfectly. We thus had a record for the night hours during which the very low pressure occurred. Having shown it to Mr. R. H. Scott, F.R.S., he very kindly gave us tracings from the records of the Richard aneroids at Valencia, Scilly, Stornoway, Aberdeen, and Yarmouth, also a series of readings taken at short intervals at Lissan, Cookstown, co. Tyrone, by Sir N. Staples, Bart. These we have reduced approximately to sea level values, and plotted on the same scale as the others.

Having this material, the question arose how to utilize it best. The accompanying plate is the solution which we offer. The horizontal line for each station represents 29 inches, and the curve the variations of pressure below that point; where the pressure fell below 28½ inches the space below it is shaded. The lowest point of the curve—*i.e.*, the lowest sea level pressure—is placed over the position of the station. The time of occurrence of the minimum is marked in figures; all those entered as p.m. refer to October 13th, all a.m.'s to the 14th.

Having drawn these curves, we found that a few others were needed to complete the series. We therefore asked Mr. S. A. Marshall for the sheet from his barograph at Skelwith Fold, Ambleside, in the English Lakes; Mr. J. E. Clark for the one from Bootham School, York; and Mr. Paget for that from Stuffynwood Hall, Mansfield, Notts, and Mr. Scott has subsequently supplied the hourly readings from the photographic barographs at Fort William and Glasgow.

It should be understood that considerable as was this depression, it is not to be regarded as unique. In London there is no record of a sea level pressure of 28 inches this century; in fact, we do not know of the pressure in London ever falling to that point, but in the West and North of Ireland, and in Scotland, there are many such cases on record. Still, it is by no means every year in which so

interesting a diagram could be drawn. The sharpening of the curve at Lissan, as compared with Valencia, is curious; and before the depression had left Scotland it was again filling up. The following table summarises the principal features in the curves:—

County.	Station.	Hours below 29·0	Hours below 28·5	Minimum. Pressure.	Minimum. Time.
Ross	Stornoway	34 ...	16 ...	28·05	0.30 a.m.
Nairn	Cawdor Castle...	32 ...	13 ...	27·96	1.15 a.m.
Aberdeen ...	Aberdeen	22 ...	12 ...	28·49	11.25 p.m.
Inverness ...	Fort William ...	? ...	8 ...	28·01	11.8 p.m.
Lanark	Glasgow	? ...	7 ...	28·24	8.43 p.m.
Tyrone	Lissan	16 ...	6 ...	28·04	5.30 p.m.
Lancashire...	Ambleside	16 ...	0 ...	28·61	5.30 p.m.
York	York	13 ...	0 ...	28·83	9.30 p.m.
Notts	Mansfield	14 ...	0 ...	28·86	11.45 p.m.
Norfolk	Yarmouth.....	0 . .	0 ...	29·10	2 a.m.
Kerry...	Valencia	22 ...	2 ...	28·44	Noon.
Middlesex ...	Camden Square	0 ...	0 ...	29·08	11 p.m.
Cornwall ...	Scilly..... ..	15 ...	0 ...	28·80	1 p.m.

The rate of fall was rapid both at Lissan and Glasgow, being nearly 0·20 in. per hour, but the feature which strikes us as most remarkable was the rise at Fort William—the readings reduced to 32° and sea level give :—

11 p.m.....	28·030 in.
11.8 p.m.	28·014 in.
Midnight	28·260 in.

This gives a rise of 0·246 in. in 52 minutes, or 0·284 in. per hour.

Of course, the shape of these curves shows how steep the gradients must have been, and therefore, that a heavy gale must have prevailed —which was the case; buildings were destroyed, ships wrecked, lives lost and trees uprooted, the worst damage being in the N. of England and Ireland, and in the S.W. of Scotland.

THE BAROMETRIC DEPRESSION OF NOVEMBER 11, 1891.

SINCE the foregoing article was prepared, another considerable depression has passed over the British Isles. As the foregoing table shows, the pressure at sea level on October 14th was at Cawdor Castle only 27·96 in.; whereas in the depression on Nov. 11th, we have not yet heard of any lower pressure than 28·31 in., which occurred at Shields at 6 p.m

As, however, this depression passed several hundred miles south of the October one, the readings were at southern stations very unusual—*e.g.* in London the pressure at sea level has, since 1858, fallen only five times below 28½ inches, viz. :

1872	Jan. 24..	4.47 a.m.	28·332 in.	1876	Dec. 4...	11.0 a.m.	28 364 in.
1873	Jan. 20..	1.0 a.m.	28·447 in.	1886	Dec. 9...	4.45 a.m.	28·295 in.
1876	Mar. 12.	0.30 p.m.	28·447 in.	1891	Nov. 11	11.45 a.m.	28·456 in.

This depression, though important, and accompanied by a destructive gale, was of course less noteworthy than that of December 9th, 1886. We are, however, not aware of any more rapid rise in London, than that between 2.30 and 3.30 p.m. on Nov. 11th—viz. : 0·155 in., of which 0·090 in. occurred between 3 and 3.30 p.m.

METEOROLOGICAL BIBLIOGRAPHY.

I AM sorry that I have not yet received a single note with reference to the article in the September number. This may have arisen from either of the following causes :—(1) Agreement with the views therein expressed; (2) Apathy.

Meanwhile it is very curious that in the October number of *The Observatory* there is an excellent article upon "Astronomical Bibliography," by Dr. J. L. E. Dreyer, F.R.A.S., which is in fact a review of the very important catalogue of the Crawford library recently published,* for a copy of which I am indebted to Dr. Copeland, the Astronomer Royal for Scotland.

As regards Dr. Dreyer's article, it in no respect runs counter to the views I expressed in September, but it reminds me of one point which I omitted to mention. Dr. Dreyer draws attention to the superiority of entries made direct from the books over those copied second-hand. On the cards which I sent to Washington, letters were placed indicating (whenever it was known) in what library each book existed. In the type-written edition this information was not given; evidently it should be in the complete edition.

It may be well to clear up a point upon which Dr. Dreyer has the following foot-note :—

"After a very extensive use of the [Crawford] Catalogue, I have only found one single error in it, viz. : on p. 237. The book of which the title is given under the name of Hippocrates is not by that author, but the last seven pages of the book are taken up by *Hyppocratis libellus de medicorum astrologia.* Lalande made two different books of this very scarce and interesting old book, of which I rejoice in the possession of a copy."

Considering that I also have a copy, we must perhaps not say very much of its scarcity, though I know of no others; but I refer to it to state what was unknown to Lalande and also both to the compiler of the Crawford catalogue and to Dr. Dreyer, viz., the name of the author of this anonymous book. It was printed at Venice in 1485, and being therefore before title pages had been thought of, begins with a heading "*Opusculū repertorii pronosticon in mutationes aeris, tam via astrologica quam metheorologica,*" &c., and has no name or signature whatever. But in 1539 Kerver, of Paris, issued in 4to *Firmini repertorium de mutatione aeris, tam via astrologica, quam metheorologica, pristino nitori restitutum,* per Phillippum Iollainum Blereium, cum scholiis eiusdem. This is a verbatim reproduction of the text of 1485, with elaborate commentaries. Therefore the early part of the volume referred to by Dr. Dreyer is by Firminus, and the latter part is a translation into Latin by Peter de Abbano of part of the writings of Hippocrates.

I have only, in conclusion, to say a few words about the handsome *Crawford Catalogue.* I wish that the personal element could be

* *Catalogue of the Crawford Library of the Royal Observatory, Edinburgh.*— Edinburgh. Published by authority of H.M. Government, 1890. 4to, viii., 498 pages.

weeded out of catalogues. The Crawford library was a splendid present to the Royal Observatory, Edinburgh, and doubtless the Astronomer Royal for Scotland felt shy at omitting to catalogue every paper in it; but the result is that the volume contains many titles which have not the slightest relation to astronomy. It is the same difficulty which Dr. Neumayer had to meet in the Hamburgh library. It is to be hoped that the time will come when it will be realized that the value of a library is *diminished* by every book which it contains that does not help to forward the subject to which the library is devoted. What conceivable astronomical interest can attach to the following :—

> HILL, ROWLAND : Requisites to the completion of Mr. Rowland Hill's plan of Post Office Improvement.—No. 1. 14 pp. 8vo. London, 1843.

This is, however, my only complaint against a work which is a credit to everyone concerned —a heavy task excellently accomplished.

G. J. S.

THE MUNICH CONFERENCE.

Dr. Erk has issued a very interesting little paper* which not merely summarizes the work of the recent Conference, but explains in a popular manner the need for such gatherings. He points out that the Meteorology of one country depends so much upon that of surrounding ones, that it is only by International exchanges that any phenomenon can be thoroughly traced, and that this cannot easily be done unless the mode and time of observation, and of publishing the data, are nearly identical in all countries. He shows how thoroughly this was recognised in the organization of the Meteorological Society of the Palatinate in 1780, but we do not agree with Dr. Erk that that Society came to an end in 1791 in consequence of the war ; we believe that its eventual collapse was due to the death of its Secretary, Hemmer. Then Dr. Erk passes on to the meeting of the British Association at Cambridge in 1845, to the congress (originated by Maury) and held in 1853, at Brussels, a congress which as regards Nautical Meteorology, left little to be reconsidered in subsequent years.

He next passes to the suggestion of an International Congress for Land Meteorology, and attributes the origination of the idea to M. Marié Davy. Following up Dr. Erk's references, we have found that M. Marié Davy's report was printed *in extenso* in the *Annuaire Soc. Met.* de France, xvi. (1868) pp. 180-188. M. Marié Davy had been charged by the Minister of Public Instruction with a mission to visit and report upon the Meteorological Observatories and

* Die Internationale Conferenz der Repräsentanten der Meteorologischen Dienste aller Länder in München (26 August bis 2 September 1891). Von. F. ERK. 8vo., 28 pages. J.B. Cotta, München, 1891.

Organizations of South-eastern Europe, and to his report he attached important remarks, which may be thus epitomized :—

"The meteorologists whom I have had the honour of meeting have been unanimous in recognizing the needs of modern meteorology, increased accuracy, more stations, not the study of one climate, nor even of grouped means, such as have been used by Maury, Quetelet, Dove and others, but of closer relations between the meteorologists, more uniformity in the modes of observation, and of publication.

"In the atmosphere which surrounds us everything is linked together. It is not sufficient to state isolated facts, they must be co-ordinated so as to trace their causes and their laws, and thence infer their return and their future effects. General studies of the facts of single days can alone help forward this work, and for it all available data must be collected and co-ordinated. Each meteorologist having before him the data for each day (and if possible the same hour of the day) for the whole globe could study them in such manner as he thought fit, and the collected result of such studies could not fail to advance the science.

"The Brussels Congress contributed powerfully to the formation of modern meteorology, and it is generally felt that a fresh one should complete the work so well begun. Why should not the model of the Statistical Congress be followed, and a *Congrés permanent de la physique du globe* be established, composed of delegates from all nations, who should meet once each year—sometimes in one capital, sometimes in another—to discuss instruments and methods of observation, publications, the results obtained both as to theory and practice, points to which the attention of observers should be directed, &c."

"The globe belongs to all the nations, all have equal interests in uniting to obtain a complete knowledge of their common property."

This report is dated Nov. 22, 1868.

In July 1869, Drs. Jelinek and Hann gave the first place in the *Zeitschrift* to an article by Dr. Jelinek upon M. Marié Davy's suggestion, and mentioned that when the International Statistical Congress met at Florence in 1867, a proposal was made as to a more liberal exchange of meteorological publications, the Austrian Meteorological office was able to say that they were already doing all that was possible, and that when in the summer of 1868 there was some talk of a general meeting of the Directors of Meteorological systems, the Austrian Government at once stated that they would bear the cost of sending their Director

The next person to take prominent action in the matter was Dr. Wild of St. Petersburg, who inserted at the end of his report for 1870, a plea for an International Congress of Meteorologists.

Finally, in May 1872, Messrs. Bruhns, Wild, and Jelinek issued the invitation which led to the assembly of the Leipzig Conference of August 14th, 1872.

The pamphlet then traces the history of the various Congresses

and Conferences which have since been held. In fact so numerous have they been that practically they have nearly realized M. Marié Davy's suggestion of an annual meeting.

The Munich Conference was well attended—in fact there were over 30 persons present at each meeting, and nearly half of them may each be described as the leading meteorologist of his country.

As we understand that Mr. R. H. Scott, F.R.S., who represented the British Isles at the Conference, and was a very active member of it, will, at the next meeting of the Royal Meteorological Society, report what was done at Munich, and it will be our duty to give an abstract of his remarks in these pages, we do not here deal with the remaining ten pages of Dr. Erk's pamphlet, as the only result would be useless repetition.

HELIGOLAND.

ENGLAND long possessed this little island, but although for nearly twenty years observations were made there three times a day, we are not aware that either the Meteorological Office, or the Colonial Office, or any other Government Department, had them worked up, or rendered available to the British public. The observations were published *in extenso* in the *Ergebnisse der Beobachtungs stationen an den deutschen Küsten*, but we doubt if even this fact was generally known.

Heligoland has now very properly been transferred to Germany, and already we have in the October number of *Das Wetter* an article extending over 11 pages, and giving a general and popular account of the climate, and information as to what the Prussian Meteorological Institute has done towards obtaining further records.

Special attention is drawn to the mildness of the winters as compared with those at stations on the mainland, and to the fact that roses may often be seen in bloom in December. In the spring, however, the temperature is kept low by the surrounding water, and the mainland stations are the warmer. In connection with this it may be well to give the mean temperature of air and sea :—

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Air.	34·9	34·7	36·1	42·3	49·5	56·8	60·4	61·2	57·7	50·0	42·6	37·6	46·9
Sea.	38·7	36·9	37·4	41·2	47·1	54·7	59·9	63·0	61·2	55·4	48·7	43·5	48·9
Diff.	—3·8	—2·2	—1·3	+1·1	+2·4	+2·1	+0·5	—1·8	—3·5	—5·4	—6·1	—5·9	—2·0

Dr. Kremser then goes on to deal with humidity, cloud, fog, rain (average about 30 inches), and other elements, and finally he states that the Prussian Government has not merely thoroughly equipped the station as a 2nd order one, but has added a thermograph and a sunshine recorder.

INSIDE A WATERSPOUT.

[THE following remarkable narrative appears in the November number of the *Leisure Hour*. As far as we are aware, the experience is unique. H. A. is apparently not a skilled meteorologist, and in some respects that is fortunate, as otherwise his report might have been quite unconsciously (especially after the lapse of 35 years) coloured by his knowledge of what ought to have happened. Hence the importance of his remark, "My sensation was that of being drawn aloft with the spiral motion of the spray and water."

It is to be hoped that now that the Richard recording aneroids are being so widely used, a waterspout or a whirlwind may go over one of them, and so teach us the amount of the up-draught. It is most fortunate that the *Leisure Hour* has gathered this useful note. —ED.]

WATERSPOUT.

"The reference in a recent number of the *Leisure Hour* to the narrow escape of the steamship 'America' from collision with a waterspout reminds me," writes a correspondent, "of my experience of one, which goes to prove that they are not all as solid and dangerous as they look.

"In 1855 I was a young officer on board the pretty clipper ship 'Crest of the Wave' (No. 37 transport), on her way to the Crimea laden with war material.

"One calm morning, when nearing the Grecian Archipelago, I was busy washing decks, until startled by a cry from the forecastle. I looked ahead, and saw bearing down upon us a huge waterspout, with its head in the clouds and its base spread over a large circle of foam and spray, a revolving, seething mass of water. I quickly called the captain, who took in the position at a glance, and the 'let go everything' was followed by the rapid downfall of top-gallant sails and topsails, &c. Just in time! for with a rush both wind and water were upon us.

"The spout did not rake us fore and aft, but zigzagged across the ship passing athwart the forecastle, then back again over amidship, and a final track along the poop, passing right over me as I stooped to clear the mizzen topsail haulyards. For a few moments my sensation was that of being drawn aloft with the spiral motion of the spray and water, not in the least that of being crushed to the deck by a heavy volume of water.

"Shaking myself like a Newfoundland dog, when I recovered from the shock, I had a good view of what was passing on the main deck, which was flooded.

"I had seen the men flying before the advancing spout from side to side, tumbling over one another, and over spars and floating casks; and now I was able to laugh, as I witnessed their efforts to regain their legs and free themselves from the rush and swirl of water caused by the roll of the ship.

"We escaped without injury to ship or crew, which was wonderful, considering the height of the sea sucked up by the spout, and the violence of the accompanying whirlwind.

"I have often wondered how many recorded instances there are of the actual impact of a waterspout with a ship, and whether there are any of a crew escaping with a fright and a bath!

"H. A."

A WEATHER ANALYSIS FOR FIVE YEARS, 1886–90.

IT may be interesting to some (especially those engaged in farming operations) to know the number of fine or wet days that may be expected in an average year. In order to effect this object, I have deduced the following summary from daily weather charts kept in North Sussex, and 372 feet above sea level.

	Very Fine.	Fine.	Fair or Cloudy.	Wet.	Very Wet.
1886	51	90	114	93	16
1887	50	103	151	52	9
1888	45	77	155	73	16
1889	57	83	134	80	12
1890	60	102	123	68	12
Average	53	91	135	73	13

It will be necessary, in order to properly appreciate the above table, to define what is understood by a very fine day, wet day, &c.:

Very Fine.—Almost cloudless, sunshine throughout.
Fine.—More sunshine than cloud.
Fair or Cloudy.—Dull or cloudy, but no rain.
Wet.—Generally rainy or very showery.
Very Wet.—Persistent heavy rain.

The averages above may be taken as a fair reckoning of the conditions for the Southern Counties of England. It will be noticed that the years vary to some extent, but in the period chosen, each year differed materially in character from its neighbour. 1886 was very wet; 1887 noted for a great drought, &c.

I will now compare the months, giving the *aggregate* returns for five years, as the individual years (though interesting) would occupy too much space. For the sake of brevity, also, the fine and very fine, and wet and very wet days, may be classed together thus :—

	Fine & very Fine.	Fair or Cloudy.	Wet & very Wet.	Total Days
January	41	79	35	155
February	44	69	28	141
March	46	59	50	155
April	53	59	38	150
May	79	50	26	155
June	80	43	27	150
July	67	46	42	155
August	69	49	37	155
September	84	39	27	150
October	76	45	34	155
November	38	64	48	150
December	41	75	39	155
Average per annum	144	135	86	365

Here it will be seen at once that—

Most fine days occur in September, June, May, and October.
Fewest ,, ,, November, December / January } equal

Also that—

Most wet days occur in March, November, July and December.
Fewest ,, ,, May, June / September } equal, and February.

These results may in some instances be contrary to general belief, and certainly it seems strange that March should have most wet days, and May the fewest; and this goes far to prove the fallacy of trusting to short periods of time. The case in point, however, may admit of explanation, being the result of an abnormal rainfall in 1888. Most of the other months (both fine and wet days) seem to agree closely with expectation or experience, and no further comment is needed when the facts are stated.

A. F. PARBURY.

Headley, Hants, September, 1891.

AN ENEMY TO HYGROMETRIC OBSERVATIONS.

MANY years ago—in our first volume, that for 1866—the Rev. C. H. Griffith (on p. 66) called attention to "A new enemy to rain gauges," viz., the leaf-cutter bee, of which he had found nine nests in the tube of one rain-gauge, nearly closing it up.

The October number of *Das Wetter* reports an analogous case with reference to a Saussure's hygrometer, in which a hair (by its variation in length) indicates variation in the humidity of the atmosphere. A spider thought that the hair would make a good basis for one of the chief supports of its web, but by putting this lateral strain on the hair the indications of the hygrometer were necessarily rendered erroneous.

THE RAINFALL OF OCTOBER, AND OF THE FIRST TEN MONTHS OF 1891.

MR. SYMONS'S letter to the *Times* inserted November 6th being too long for reproduction here, we quote the principal statements, and add values received since that letter was written.

"The floods in some parts of England having again brought the subject of rainfall prominently forward, I herewith submit an epitome of the facts as at present reported.

"As regards the rainfall in London, my own record goes back to January 1858, and the wet Octobers have been :—

October, 1865	6·22 in.
October, 1872	5·20 in.
October, 1880	5·78 in.
October, 1882	4·96 in.
October, 1891	4·80 in.

Therefore, as far as London is concerned, a fall as large as, or larger than, that of October, 1891, occurs about once in seven years, and there is nothing very exceptional in the recent fall in the metropolis; and as compared with the average for the month—and October is usually the wettest month in the year—it is only 66 per cent. above it.

"The exceptional feature, as far as the metropolis is concerned, has been the excess of three out of the last four months, so that we have had :—

—	1891	Average.	Excess in 1891.		Greatest previously.
			Amount.	Per Cent.	
July to October inclusive.....	in. 14·40	in. 9·96	in. 4·44	44	15·38in. in 1880

This shows that we have had during the last four months nearly half as much again as our average, and nearly as much as in the wettest corresponding period during 34 years. If to this be added the fact that, out of the 123 days, rain fell on 74, it will be understood that the weather in the metropolis has not been pleasant."

The letter then gave a tabular statement, of which, as regards October, the majority of the values are given in the tables in this magazine, and as regards the ten months, was a summary of the similar tables for the ten months of the present year.

This was followed by a series of remarks by observers, many of which are re-produced under the heading of Meteorological Notes on October on p. 159. The letter concluded as follows :—

"From the foregoing table and remarks it will be seen that the fall has been exceptionally large during October over the southern half of England and the whole of Wales, and that at many stations it has been without precedent for a quarter of a century.

"As regards the total for the ten months of the present year, it must be remembered that February was as exceptionally dry as some of the subsequent months have been wet. The early part of the year was generally dry, but we have had a wet July, wet August, and wet October, which have left us at the end of the tenth month with no departure from the average of an important character. The aggregate is in no way exceptional, but the irregularity of the distribution has caused trouble and loss, especially to those who were not prompt to seize such dry periods as did occur."

Muswell-hill.—The total for the month, 6·00 in., is greater than that of any other October since the gauge was started in 1872.

Keston Tower.—Total, 6·87 in., greater than in any month in my record; the next highest is 6·62 in. in Oct., 1882.

Crowborough, Sussex.—Total, 9·28 in. The record goes back to 1871, and the greatest in October previously was 8·30 in. in 1882.

Redlands, Emsworth.—Largest R, 6·72 in., of any month since record commenced in 1884.

Ivy Bank, Southampton.—Total, 9·36 in. The record commenced in 1878, and the greatest in any month previously was 7·20 in. in December, 1886.

Red Lodge, Southampton.—R, 9·18 in., most unusual. I have looked back 20 years in my register, and can find no single month to approach this October in quantity.

Hinton, Alresford.—Total, 11·22 in. The record goes back 11 years, and the greatest previous fall was 6·30 in. in October, 1889.

Ashdell, Alton.—R, 9·07 in. The wettest month for 25 years; the next wettest was 8·14 in. in December, 1869.

Kensworth, Herts.—Total, 8·31 in. Record goes back 25 years, and the wettest previous October was 1882, 6·80 in.; the wettest previous month was July, 1889, 6·86 in.

Great Marlow.—Total, 9·03 in.; the greatest in any month for 13 years.

Newport Pagnell.—Total, 6·00 in. Record goes back 21 years; the wettest October previously was 1880, 5·54 in., and the only wetter month was July, 1880, 6·27 in.

Castle Ashby, Northampton.—Total, 6·33 in.; the greatest in any month since I began observing in 1873.

Alconbury.—Total, 5·39 in. This has been the wettest October for 8 years.

Fulbourn Asylum, Cambridge.—R (5·43 in.) excessive; the most ever recorded here in October.

Bishop's-hill, Ipswich.—Total, 4·69in.; the greatest in any month for 20 years.

Northlands, Salisbury.—Total R, 10·40 in. During the time that I have been an observer (24 years) the fall for one month has never previously exceeded 8·25 in. in 1876.

Heatherlands, Parkstone.—R for Oct. (8·80 in.) is more than 2½ times the mean of the previous 9 years, during which I have taken observations.

Babbacombe, Torquay.—Total, 10·37 in.; the maximum in October, and indeed in any month since observations began in 1876.

Holne Vic., Ashburton.—Total, 15·24 in.; 4 falls of over 1 in. and 2 falls of over 2 in. of R.

Stowell Rect., Somerset.—Total, 8·57 in.; the greatest monthly fall since 1876.

Wells.—Total, 7·95 in. The heaviest fall registered since 1878, except August, 1881, and July, 1882. The moor lands between Wells and Burnham flooded, and many families obliged to leave their cottages in boats.

Harptree Court, Somerset.—Total, 10·04 in.; wettest month since record began in 1882.

Clifton, Bristol.—Total, 8·49 in.; the wettest month for 39 years, except August, 1865, 8·51 in.

Cirencester.—Total, 8·46in.; the greatest record here since November, 1852, 8·95 in.

The Graig, Ross.—Total, 6·70 in. I have not previously registered 6·00 in. in October. In 1843, 6·28 in. was gauged at another station in Herefordshire, which is the heaviest fall recorded in October since 1818.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, APRIL, 1891.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	Total Rain. Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	66·3	28	28·1	1	53·7	36·6	36·3	73	111·3	21·9	1·13	9	6·1
Malta	84·5	9	49·0	23	67·0	53·7	51·0	77	144·5	41·7	1·18	11	4·7
Cape of Good Hope	93·7	10	43·5	25	72·5	54·8	...	...	...	...	2·94	5	...
Mauritius	81·0	4	68·7	26	79·4	71·8	68·5	80	131·9	57·3	7·23	20	6·8
Calcutta	102·7	14	68·1	1	96·8	76·2	73·4	68	158·5	59·1	·54	3	2·3
Bombay	90·7	17	72·8	3	87·2	76·5	73·0	75	139·0	59·7	·00	0	2·0
Ceylon, Colombo	89·9	20	71·6	...	88·1	74·8	72·7	77	148·0	64·5	5·93	18	4·6
Melbourne	82·5	6	41·0	26	66·2	50·0	49·2	73	131·5	30·0	2·41	11	6·5
Adelaide	87·5	10	44·5	30	71·8	54·7	49·6	61	154·0	33·2	·85	8	5·4
Tasmania, Hobart	72·0	10	38·2	25	60·9	46·2	46·9	76	127·0	31·0	1·56	15	6·5
Wellington	69·0	3,4*a*	43·0	7, 27	62·5	50·3	51·6	84	122·0	35·0	5·34	14	4·0
Auckland	73·0	3	48·5	27	65·5	54·0	52·0	76	132·0	41·0	3·63	15	6·0
Jamaica, Kingston	89·1	25	68·4	2, 3	86·3	71·9	68·5	70	...	...	1·25	...	...
Trinidad	...	...	...	...	...	...	...	...	...	...	...	...	...
Toronto	77·5	22	20·5	6	52·1	34·8	35·4	71	...	9·0	2·31	14	5·4
New Brunswick, Fredericton	67·3	28	16·3	1	48·6	29·2	29·0	65	...	...	2·05	20	6·5
Manitoba, Winnipeg	89·6	25	3·0	3	56·4	31·2	35·2	72	...	...	1·14	8	4·2
British Columbia, Esquimalt	62·2	4	32·0	1	54·6	41·1	42·6	83	...	...	2·72	19	7·4

a And 15.

REMARKS.

MALTA.—Mean temp. 58°·9; mean hourly velocity of wind 12·3 miles. The sea temp. rose to 61°·3. TSS on 13th and 28th. L on 24th. J. SCOLES.

Mauritius.—Mean temp. of air 0°·9 below; dew point 0°·4 above; R 1·51 in. above, their respective averages. Mean hourly velocity of wind 10·5 miles, or 0·3 below average; extremes, 26·7 on 14th and 1·9 on 1st and 20th; prevailing direction S.E. by E. L on 2nd, T and L on 3rd and 12th, and T on 10th, 19th, and 20th. C. MELDRUM, F.R.S.

CEYLON, COLOMBO.—TSS occurred on 10 days, and L alone was seen on 8 days. J. C. H. CLARKE, Lieut.-Col., R.E.

Melbourne.—Mean temp. of air 0°·9, and of dew point 0°·2 below the average. R ·14 in., humidity 1, and cloud 0·6 above the average. Prevailing wind S. to S.E.; strong on 5 days. Heavy dew on 16 days. Fog on the 29th. L on the 11th. R. L. J. ELLERY, F.R.S.

Adelaide.—Mean temp. 1°·2, and R ·81 in. below, the average of 34 years. C. TODD, F.R.S.

Wellington.—The first few days were fine, then 1·76 in. of R fell on night of 3rd, and it was showery up to the 9th; fine from 9th to 23rd, when R commenced, and continued until the end of the month. Prevailing wind N.W., strong on 8 days. Mean temp. 0°·6 below, and R 1·81 in. above, the average. R. B. GORE.

Auckland.—An average month, with little of note to report. R slightly above the average. Mean temp. a little below. T. F. CHEESEMAN.

SUPPLEMENTARY TABLE OF RAINFALL, OCTOBER, 1891.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger Hall.	7·58	XI.	Builth, Llanwrtyd Wells	11·65
,,	Margate, Birchington...	...	,,	Rhayader, Nantgwillt..	11·59
,,	Brighton, Prestonville Rd	7·17	,,	Corwen, Rhug	5·41
,,	Hailsham	6·22	,,	Carnarvon, Cocksidia ...	7·27
,,	Ryde, Thornbrough	9·03	,,	I. of Man, Douglas	6·66
,,	Alton, Ashdell.....	9·07	XII.	Stoneykirk, Ardwell Ho.	6·47
III.	Oxford, Magdalen Col...	5·63	,,	New Galloway, Glenlee	11·03
,,	Banbury, Bloxham	5·98	,,	Melrose, Abbey Gate...	2·79
,,	Northampton	4·15	XIII.	N. Esk Res. [Penicuick]	3·08
,,	Cambridge, Fulbourne..	5·43	XIV.	Ballantrae, Glendrishaig	7·30
,,	Wisbech, Bank House..	4·99	,,	Glasgow, Queen's Park.	3·63
IV.	Southend	3·88	XV.	Islay, Gruinart School..	8·25
,,	Harlow, Sheering	4·92	XVI.	Dollar.....	3·03
,,	Rendlesham Hall	3·53	,,	Balquhidder, Stronvar..	12·89
,,	Diss	3·67	,,	Coupar Angus Station..	3·92
,,	Swaffham	3·99	,,	Dunkeld, Inver Braan..	6·46
V.	Salisbury, Alderbury...	9·00	,,	Dalnaspidal H.R.S. ...	7·69
,,	Warminster	...	XVII.	Keith H.R.S.	1·44
,,	Bishop's Cannings	6·32	,,	Forres H.R.S.	·49
,,	Ashburton, Holne Vic....	5·24	XVIII.	Fearn, Lower Pitkerrie.	·80
,,	Okehampton, Oaklands.	9·30	,,	Loch Shiel, Glenaladale	13·25
,,	Lynmouth, Glenthorne.	9·12	,,	N. Uist. Loch Maddy ...	11·72
,,	Probus, Lamellyn	7·76	,,	Invergarry	5·20
,,	Launceston, S. Petherwin	...	,,	Aviemore H.R.S.	1·51
,,	Wincanton, Stowell Rec.	8·57	,,	Loch Ness, Drumnadrochit	2·04
,,	Wells, Westbury.....	...	XIX.	Lairg H.R.S.	1·29
VI.	Bristol, Clifton	8·49	,,	Scourie	4·63
,,	Ross, The Graig	6·70	,,	Watten H.R.S.	2·36
,,	Wem, Clive Vicarage ...	3·91	XX.	Dunmanway, Coolkelure	8·84
,,	Cheadle, The Heath Ho.	4·54	,,	Fermoy, Gas Works ...	5·39
,,	Worcester, Diglis Lock	5·85	,,	Darrynane Abbey.....	7·85
,,	Coventry, Coundon	6·23	,,	Tipperary, Henry Street	4·59
VII.	Ketton Hall [Stamford]	5·02	,,	Limerick, Kilcornan ...	2·92
,,	Grantham, Stainby	4·64	,,	Ennis	4·02
,,	Horncastle, Bucknall ...	3·85	,,	Miltown Malbay.....	6·19
,,	Worksop, Hodsck Priory	3·70	XXI.	Gorey, Courtown House	6·24
VIII.	Neston, Hinderton	2·85	,,	Mullingar, Belvedere...	3·93
,,	Knutsford, Heathside...	4·51	,,	Athlone, Twyford	3·91
,,	Lancaster	4·80	,,	Longford, Currygrane...	3·49
,,	Broughton-in-Furness..	6·30	XXII.	Galway, Queen's Coll...	6·34
IX.	Ripon, Mickley	4·35	,,	Crossmolina, Enniscoe..	9·44
,,	Scarborough, West Bank	3·41	,,	Collooney, Markree Obs.	5·22
,,	East Layton [Darlington]	3·88	,,	Ballinamore, Lawderdale	4·27
,,	Middleton, Mickleton..	1·98	XXIII.	Lough Sheelin, Arley ..	3·61
X.	Haltwhistle, Unthank..	2·32	,,	Warrenpoint	3·07
,,	Bamburgh.....	2·70	,,	Seaforde	5·49
,,	Shap, Copy Hill	...	,,	Belfast, New Barnsley..	4·38
XI.	Llanfrechfa Grange	8·93	,,	Bushmills, Dundarave...	3·89
,,	Llandovery	10·61	,,	Stewartstown	3·04
,,	Castle Malgwyn	10·92	,,	Buncrana	5·04

OCTOBER, 1891.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE. Max Deg.	Date	Min. Deg.	Date	No. of Nights below 32° In shade.	On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	4·80	+ 1·91	·64	7	20	65·9	9	29·7	31	1	3
II.		Maidstone (Hunton Court)...	6·32	+ 2·86	·83	21	23	...	...	...	...	...	...
,,		Strathfield Turgiss	7·97	+ 5·13	1·17	6	24	65·3	9	26·1	31	1	10
III.		Hitchin	6·28	+ 3·21	1·08	6	24	63·0	1	28·0	30	3	...
,,		Winslow (Addington)	6·71	+ 3·62	1·18	6	22	64·0	3, 5*a*	27·0	31	1	3
IV.		Bury St. Edmunds (Westley)	4·12	+ ·85	·53	15	19	...	...	...	...	...	...
,,		Norwich (Cossey)	3·96	+ ·12	·52	21	18	66·0	2	25·0	31	1	...
V.		Weymouth(LangtonHerring)	8·77	+ 5·23	1·23	6	22	61·0	5	32·0	31	1	...
,,		Barnstaple.....	?3·98	— 1·11	·68	18	19	67·0	3	34·0	25	0	..
,,		Bodmin (Fore Street)	10·29	+ 4·29	1·57	5	25	...	...	...	...	...	...
VI.		Stroud (Upfield)	6·92	+ 3·89	1·34	6	24	65·0	7	31·0	30	1	...
,,		ChurchStretton(Woolstaston)	6·04	+ 2·27	1·19	14	24	60·0	9	30·0	31	1	4
,,		Tenbury (Orleton)	7·02	+ 3·81	1·15	5	23	63·0	9	26·2	31	3	7
VII.		Leicester (Barkby)	4·89	+ 1·74	·94	6	25	65·0	9	23·0	30	3	6
,,		Boston	4·08	+ ·97	·60	6	20	64·0	1	28·0	31	1	...
,,		Hesley Hall [Tickhill].....	3·46	+ ·36	1·07	6	19	62·0	9	28·0	31	4	...
VIII.		Manchester(PlymouthGrove)	4·85	+ 1·48	·92	6	19	...	...	...	...	...	...
IX.		Wetherby (Ribston Hall) ...	3·38	+ ·25	·51	7	16	...	...	...	...	...	...
,,		Skipton (Arncliffe)	7·56	+ 1·53	1·34	14	22	60·0	4	30·0	29	4	...
,,		Hull (PearsonPark)	3·31	— ·34	·55	6	20	63·0	3	30·0	25	0	8
X.		Newcastle (Town Moor)	1·82	— 1·30	·26	8	16	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	15·92	+ 5·33	1·90	8	21	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	8·17	+ 3·63	1·50	18	22	...	...	...	...	...	...
,,		Haverfordwest	10·06	+ 4·91	1·52	19	25	62·2	1	29·5	30	2	...
,,		Carno (Tybrith)	6·25	+ ·73	·95	14	23	...	...	23·0	29	6	...
,,		Llandudno.....	4·06	+ ·67	·55	18	19	62·2	3, 4	34·0	31	0	...
XII.	SCOTLAND.	Cargen [Dumfries]	9·02	+ 5·76	1·38	18	19	59·0	5	27·8	25*d*	4	...
,,		Jedburgh (Sunnyside).....	1·88	— ·77	·38	12	15	58·0	6	27·0	29	3	...
XIV.		Old Cumnock	5·41	+ 2·01	·85	5	23	...	...	...	...	...	...
XV.		Lochgilphead (Kilmory).....	10·73	+ 5·94	2·16	8	20	...	...	27·0	24	5	...
,,		Oban (Craigvarren)	7·85	...	1·03	13	23	59·0	3	33·2	30	0	...
,,		Mull (Quinish).....	8·37	+ 3·08	1·04	4	22	...	...	...	...	...	...
XVI.		Loch Leven Sluices.....	2·60	— ·36	·70	9	11	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	2·85	+ ·61	·60	8	12	64·2	4	29·0	31	3	...
XVII.		Braemar	4·93	+ 1·32	·89	4	18	56·0	3, 5	20·3	29	11	17
,,		Aberdeen (Cranford)	2·78	...	·48	15	18	59·0	4	29·0	28	5	...
XVIII		Strome Ferry.....	...	...	...	...	...	...	..	...	...	...	...
,,		Inverness (Culloden)	·81	— 1·44	...	...	...	61·0	3	26·0	29	4	...
XIX.		Dunrobin	·77	— 2·54	·17	16	7	59·0	4	32·0	28*d*	2	...
,,		S. Ronaldsay (Roeberry).....	2·04	— 1·69	·50	6	16	58·0	3	36·0	13	0	...
XX.	IRELAND.	Dromore Castle	7·73	+ 2·09	1·10	14	18	58·0	14*b*	33·0	28	0	...
,,		Waterford (Brook Lodge) ...	5·47	+ 1·65	1·10	15	18	61·5	4	27·0	25	2	..
,,		O'Briensbridge (Ross)	...	...	...	...	...	...	...	...	...	...	..
XXI.		Carlow (Browne's Hill)	4·71	...	1·12	5	17	...	...	...	...	...	...
,,		Dublin (FitzWilliam Square)	3·59	+ ·21	1·18	13	13	62·7	4	33·0	25	0	7
XXII.		Ballinasloe	4·47	+ 1·48	1·11	13	18	58·0	3	24·0	25	9	...
,,		Clifden (Kylemore)	15·55	...	1·74	4	24	..	...	...	...	...	...
XXIII		Waringstown	4·09	+ 1·38	·94	15	16	62·0	3, 4	27·0	24	5	11
,,		Londonderry (Creggan Res.).	3·29	— ·38	·61	13	22	...	...	...	...	...	...
,,		Omagh (Edenfel)	4·61	+ 1·51	1·05	13	22	57·0	4*c*	28·0	29	4	6

a And 9. *b* And 16, 29. *c* And 5, 8. *d* And 29.

+ Shows that the fall was above the average ; —that it was below it.

METEOROLOGICAL NOTES ON OCTOBER, 1891.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail. S for Snow.

ENGLAND.

STRATHFIELD TURGISS.—More rain fell at this station than has ever before been recorded in any month, and never before has a fall of more than one inch occurred on two consecutive days. On the 21st 1·01 in. fell, and on the 22nd 1·03 in. The floods ensuing have been altogether unprecedented. T and L on the 7th.

ADDINGTON.—Not only the wettest October, but with one exception (July, 1880,) the wettest month of the last 21 years. Our brooks ran quite full for over a fortnight, often overflowing the meadows to a great extent, and causing much inconvenience. Winds frequently very high, uprooting some big trees. T with H and R on 14th and 21st. No frost to hurt anything until the morning of the 31st, when all tender plants were cut down.

BURY ST. EDMUNDS, WESTLEY.—A mild wet month; no frost till the 30th; violent gale on the 13th; severe TS with H on the 15th. The Barometer was lowest for the whole year on the 21st—28·850 in., and highest for the whole year on the 31st—30·475 in. Wheat sowing is very backward on the heavy land.

LANGTON HERRING.—Excepting December, 1876, when the R was 9·18 in., this has been the wettest month since the observations commenced. The fall from the 5th to the 22nd was 8·12 in., which far exceeds the fall of any previous 18 consecutive days. A great gale occurred on the 13th, but not much injury was done in this neighbourhood. T and L on the 7th and L on the 21st.

BODMIN.—Rather cold, with excessive R, several gales, and H showers at times. The greatest R for October on record. Heavy R on 1st, and from 5th to 26th; thence to the end of the month fine and sunny days, with frosty nights; gales on the 26th and 28th; harvest not finished at the close.

STROUD, UPFIELD.—Corn and grass still lying out in the fields at the close. S.W. gale on the 13th; many trees blown down.

WOOLSTASTON.—A very wet month, and a great deal of grain unharvested at the end. A strong gale on the 5th, and a very violent gale on the 13th; followed by wild squally weather for three days. Mean temp. 47°·7.

ORLETON.—The wettest October recorded here in 60 years, and in that period there have been only seven months with a larger R. The temp. was about the average, but there was less frost than usual. T on the 13th and 14th: fogs on 3rd, 5th and 12th; dense fog on 8th. The first 5 days were fine, but about 0.30 a.m. on 6th, heavy R began, and continued with one interval till 8 p.m., 2·06 in. falling in the 19 hours. R fell on every day but 24th, from 5th to 26th, and there was one fall over an inch, 4 over ·75 in., 5 over ·50 in. and 8 over ·25 in., in the 24 hours.

LEICESTER, BARKBY.—Oddly enough it was a very fine, though very wet month; the R falling chiefly at night, and sunshine being above the average. Swallows left about the 22nd, and flocks of fieldfares were seen on the 16th. First frost on 28th; T on the 14th and 15th; very high winds on seven days.

MANCHESTER, PLYMOUTH GROVE.—Mean temp. 48°·5. Fine autumn weather prevailed from 3rd to 5th, 8th to 10th, on 13th, 18th, 20th, and from the 27th to the end of the month. TL and H on the 14th. Dense fog and wet mist on morning of 25th.

WALES.

HAVERFORDWEST.—This October stands third in wetness of all the months during the last 42 years. Dec. 1868 had 10·48 in., Nov. 1852, 10·37 in., and in Oct. 1891, 10·06 in. One continuous series of gales occurred from the 8th

to the 15th ; one of almost hurricane violence on the 13th, also on the 11th, and it was very stormy more or less up to the 25th, with continuous R. The wind which had been blowing constantly from S.W. and S. suddenly veered to N.N.W. on the evening of the 27th ; next morning it was due E., and the mean temp. fell 6°, this continued to the end, with clear skies and sharp white frosts.

SCOTLAND.

CARGEN.—The month up to the 23rd was unusually stormy and wet. Several gales occurred ; the last concurrently with a high spring tide, when the Nith was unusually swollen with the heavy R occasioned much damage to the embankments, and large tracts of arable land were submerged, and much stock drowned. The R from the 1st to 22nd—9·02 in., was more than twice the average for the whole month. On three days, 5th, 8th and 18th, upwards of one inch, fell on each day. Very fine weather was experienced after the 23rd. The R from August 1st to Oct. 22nd was 22·24 in., and for the previous seven months was 13·55 in. T and L on 6th, 8th, 9th, 20th and 21st, and H on 6th. Lunar rainbow seen between 10.30 and 11 p.m. on the 21st.

JEDBURGH.—The weather was wild and stormy during the first half of the month, but after that very quiet, with much sunshine. Cereal crops all got in and in better condition than was expected. High winds on 6th ; gales on 12th and 13th.

OLD CUMNOCK.—High wind at night on the 5th ; stormy on 13th, 15th and 18th ; T on 20th ; frost from 24th to 30th.

OBAN.—The month was one of almost continuous R, floods and heavy gales, till the last week, which was fair and frosty, with fogs This enabled potatoes to be saved, but some hay was still out at the close. T and L on 6th and 12th.

S. RONALDSAY, ROEBERRY.—A very fine month upon the whole ; especially the first and latter parts ; during the middle strong winds from S.W. prevailed, and a rough gale from S. on night of 13th and morning of 14th.

IRELAND.

WATERFORD, BROOK LODGE.—Mean temp. 48°·0 ; T on 6th and 15th ; gale from S. on 11th.

DUBLIN.—A month of contrasts. At the beginning some fine, warm, autumnal days were experienced, interrupted indeed by a gale and heavy R on 5th. From the 8th to the 18th was a period of violent gales and heavy rains, with brief intervals of fine weather and very unsteady temperature. Then followed a week of low barometer, but fair weather and low temperature ; from the 25th to the 31st was fine and quiet, with ground frosts and local fogs at night ; bright and warm sunshine by day, with E. winds. Mean temp. 49°·5, or 0°·2 below the average. Solar halos seen on 2nd, 7th and 22nd. High winds on 12 days, attaining the force of a gale on 8 ; fogs on 6 days ; L on 3 days ; H on 17th.

BALLINASLOE.—Strong S.W. gale on 18th. Fog on morning of 29th and all day on 30th.

KYLEMORE.—Very stormy from 4th to 6th, with 3·41 in. of R ; H on 7th ; strong S.W. gale on 8th ; R and sleet all night on the 15th and S on the mountains. Gale from S. with heavy R on 18th ; TL and heavy R on 20th, On 6 days the R exceeded 1·00 in. in 24 hours.

WARINGSTOWN.—Extraordinary range of barometer, 13th 3 p.m. 27·988 in. ; 31st, 9 a.m. 30·662 in. No R fell after the 21st, but on two occasions (25th and 30th), fog produced a measurable amount.

EDENFEL.—For the first 3 weeks gales and rains continued without the intermission of a single day, but upon the 21st an anticyclone began to spread itself over the North of Ireland, and continued accompanied by generally bright skies, or light hazy weather, calms, and occasional night frosts to the end.